

Name _____ Period _____

Chapter 4: A Tour of the Cell***Cells on the Move***

1. How did Robert Hooke describe the cork bark that he observed?
2. What part of the cell was Robert Hooke actually observing?
3. What color are most living cells?

4.1 Microscopes reveal the world of the cell

4. The study of cells has been limited by their small size, and so they were not seen and described until 1665, when Robert Hooke first looked at dead cells from an oak tree. His contemporary, Anton van Leeuwenhoek, crafted lenses and with the improvements in optical aids, a new world was opened. Magnification and resolution limit what can be seen. Explain the difference.
5. Since the invention of the microscope many discoveries have been made regarding cells. With these discoveries scientists were able to formulate the cell theory. Explain the cell theory.
6. The development of electron microscopes has further opened our window on the cell and its organelles. How does the electron microscope differ from a light microscope?
7. What is considered a major disadvantage of electron microscopes?

4.2 Most cells are microscopic

8. Although not all cells are the same size there are limits to how small or large a cell can be. What factor limits a cell's size.

9. What limits the minimum size any cell can be?
10. What limits the maximum size a cell can be?
11. Ultimately, a cell's surface area to volume ratio will determine how large or small a particular cell is. A cell must have a surface area large enough to accommodate the volume of the cell. Explain how both surface area and volume are calculated.

4.3 Prokaryotic cells are structurally simpler than eukaryotic cells

12. Which two types of organisms consist of prokaryotic cells?
13. Regardless of the type of cell, all cells have several basic features in common. Describe the features that all cells have in common.
14. How are eukaryotic cells different from prokaryotic cells?
15. On the sketch of a prokaryotic cell, label each of these features **and give its function or description**.

cell wall

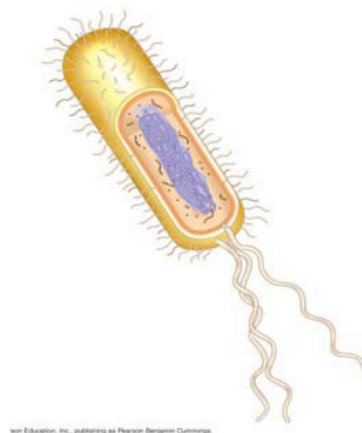
plasma membrane

bacterial chromosome

nucleoid

cytoplasm

flagella



4.4 Eukaryotic cells are partitioned into functional compartments

16. Due to their membrane enclosed organelles, the eukaryotic cell is compartmentalized. All these organelles can be organized into 4 basic functional groups. Provide the cell organelle that performs the functional group listed below.

Manufacturing:

Breakdown/Hydrolysis:

Energy-converting:

Support/communication/movement:

17. Although plant and animal cells have many similarities, there are some differences between them. Explain the structural differences between plant and animal cells.

4.5 The structure of membranes correlates with their function

18. What is the function of the plasma membrane?
19. What is the major component that forms the plasma membrane?
20. Make a general drawing of your answer to number 19 and label it.
21. Describe a phospholipid bilayer.
22. Make a general drawing of a phospholipid bilayer and label it.

23. Now that we know the plasma membrane is composed of a phospholipid bilayer, explain how the structure of the plasma membrane allows it to function as a selective barrier.

4.6 The nucleus is the cell's genetic control center

24. What is the function of the cell's nucleus?
25. How does the nucleus go about performing this function?
26. Found within the nucleus are the *chromosomes*. They are made of *chromatin*. What are the two components of chromatin? When do the thin chromatin fibers coil up to become distinct chromosomes?
27. What structure surrounds the nucleus?
28. Describe the structure that surrounds the nucleus.
29. What function does the structure that surrounds the nucleus perform?

4.7 Ribosomes make proteins for use in the cell and export

30. What is the function of ribosomes?
31. Ribosomes in any type of organism are all the same, but we distinguish between two types of ribosomes based on where they are found and the destination of the protein product made. Complete this chart to demonstrate this concept.

Type of Ribosome	Location	Product
<i>Free ribosomes</i>		
<i>Bound ribosomes</i>		

4.8 Overview: Many organelles are connected through the endomembrane system

32. List all the structures of the endomembrane system.

4.9 The endoplasmic reticulum is a biosynthetic factory

33. List and describe three major functions of the smooth ER.

34. The rough ER is studded with ribosomes. As proteins are synthesized, they are threaded into the lumen of the rough ER. Some of these proteins have carbohydrates attached to them in the ER to form glycoproteins. What does the ER then do with these secretory proteins?

35. Besides packaging secretory proteins into transport vesicles, what is another major function of the rough ER?

4.10 The Golgi apparatus finishes, sorts, and ships cell products

36. Describe the structure of the Golgi apparatus?

37. What determines the size, or number of stacked sacks, of the Golgi apparatus in any given cell?

38. Describe the function, or role, the Golgi apparatus plays in the cell.

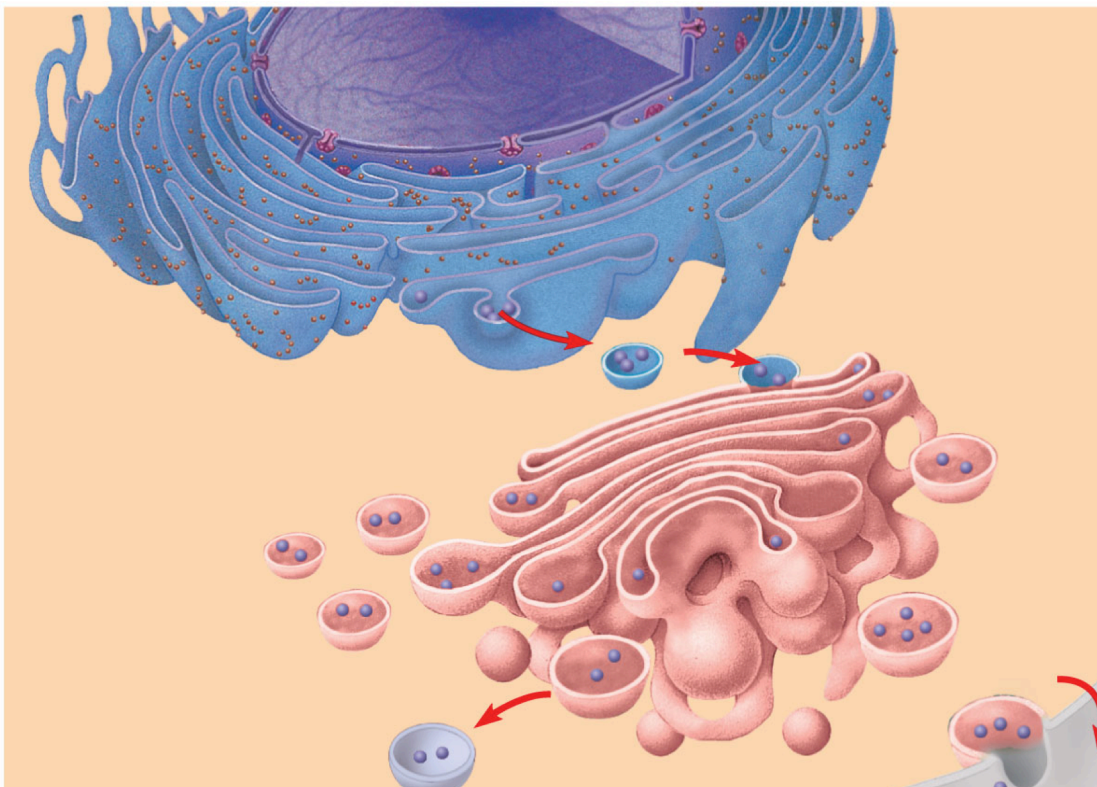
39. What is the relationship of the Golgi apparatus to the ER in a protein-secreting cell?

4.11 Lysosomes are digestive compartments within a cell

40. Explain how lysosomes illustrate the main theme of eukaryotic cell structure, compartmentalization.
41. Describe the functions of lysosomes.

4.13 A review of the structures involved in manufacturing and breakdown

42. The cell is a very intricate and coordinated system that requires the use of multiple systems that must work together in order for the cell to function properly. Insulin, for example, must be produced and secreted by cells in order for proper functioning of not only the cell but the whole organisms. Use this figure to explain how the elements of the endomembrane system function together to secrete a protein, like insulin. Label as you explain.



4.14 Mitochondria harvest chemical energy from food

43. Mitochondria are not considered part of the endomembrane system, although it is enclosed by membranes. Sketch a mitochondrion here and label its outer membrane, inner membrane, inner membrane space, cristae, and matrix.

44. What is the function of the mitochondria?

4.15 Chloroplast convert solar energy to chemical energy

45. Chloroplast are not considered part of the endomembrane system, although it is enclosed by membranes. Sketch a chloroplast here and label its outer membrane, inner membrane, inner membrane space, thylakoids, granum and stroma.

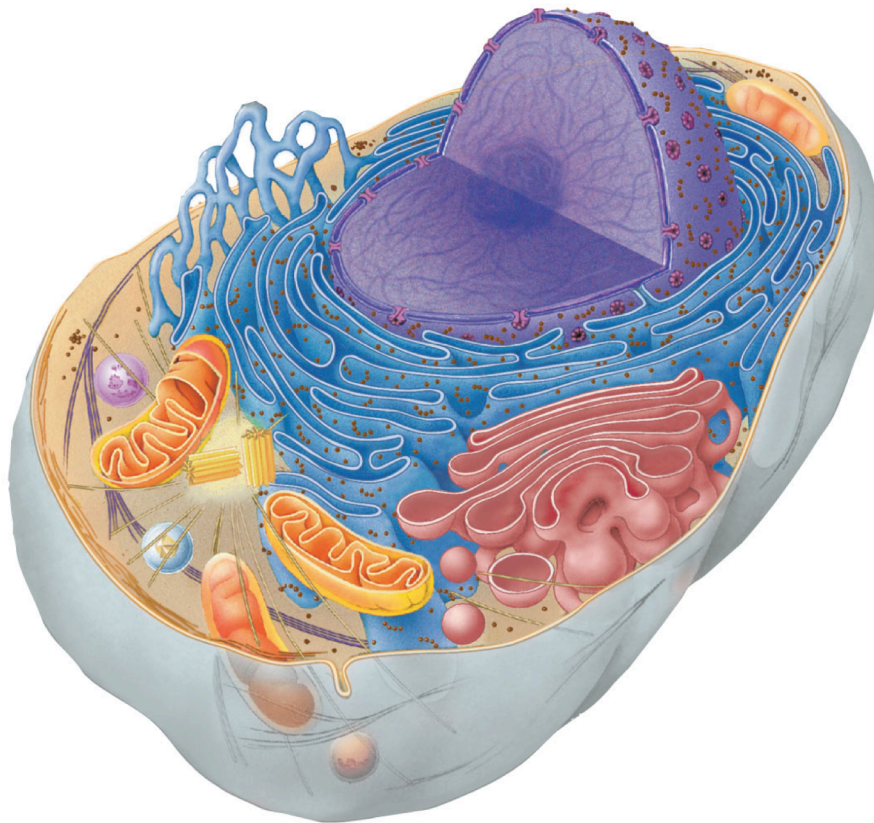
46. What is the function of the chloroplast?

4.16 Mitochondria and chloroplasts evolved by endosymbiosis

47. What is an endosymbiont?
48. What is the hypothesis of endosymbiosis?

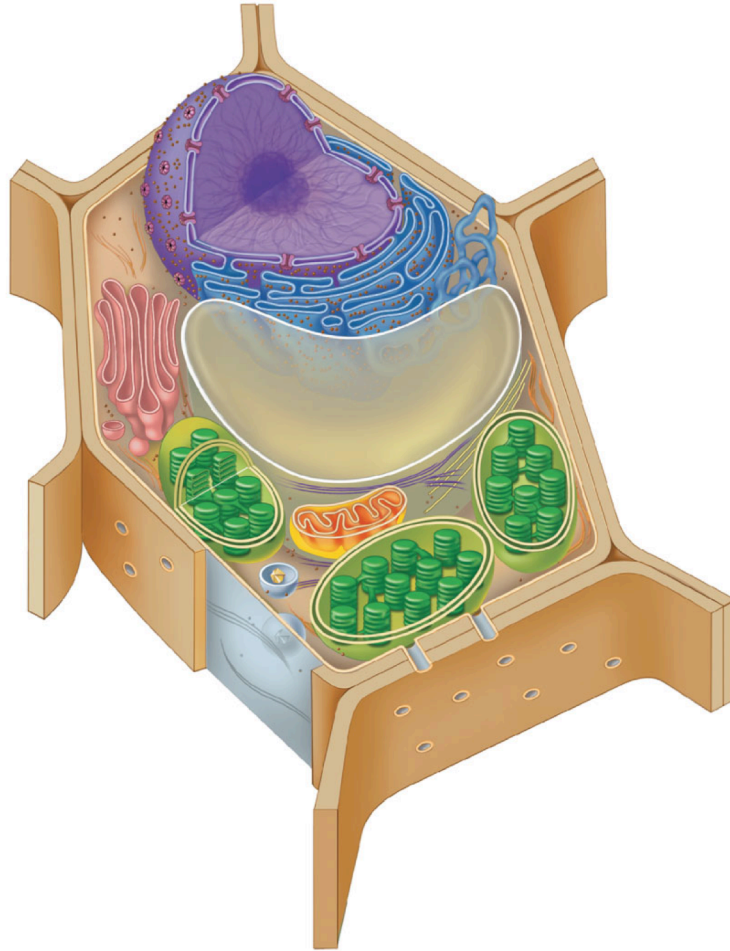
SUMMARY

49. On the diagram of an animal cell below, label each organelle and give a brief statement of its function.



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50. On the diagram of an plant cell below, label each organelle and give a brief statement of its function.



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